



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/846,889	05/01/2001	Thomas P. Feist	08CN08803C	5322

23413 7590 03/27/2003

CANTOR COLBURN, LLP
55 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

EXAMINER

BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
----------	--------------

1773

10

DATE MAILED: 03/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/846,889

Applicant(s)

FEIST ET AL.

Examin r

Kevin M Bernatz

Art Unit

1773

-- The MAILING DATE of this c mmunication appears on the c ver sheet with the c rrespondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-59 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-59 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5-9 . 6) ☐ Other: .

Art Unit: 1773

DETAILED ACTION

Examiner's Comments

1. The examiner notes that claim 55 was omitted. As such, claims 56 – 60 have been renumbered as claims 55 – 59, and these latter claim numbers will be referred to throughout this action.
2. Claims 1, 16 and 17 recite limitations in the axial displacement, yet applicants have not recited the test method used to measure these properties. For purposes of evaluating the prior art, the examiner has interpreted the axial displacement in the broadest reasonable interpretation and any art recognized measurement method may be used for these properties. The examiner has interpreted axial displacement to be measurements of the deflection of a disk. See Sandstrom (U.S. Patent No. 5,972,461), where they measure the axial displacement of a disk (*col. 3, lines 5- 18; col. 3, line 64 bridging col. 4, line 14; col. 5, lines 13 – 14; and Figure 4 – where Figure 4 shows axial displacement vs. disk thickness and Sandstrom discloses Figure 4 as “a graph illustrating variations in deflection for disks having different substrate thick nesses”, hence implying that axial displacement is simply another word for deflection*).
3. Claims 40 and 43 require a substrate or core having the limitation “varied thickness”. This limitation has been interpreted in view of the specification (*Figures 8 – 13 and 25 – 35; and claims 44 and 46*) and has been given its broadest reasonable interpretation as allowing for any varying thickness along any axis (length, width, height,

Art Unit: 1773

radial or tangential), including cases where the core varies in thickness from zero thickness in some regions to a non-zero thickness in others.

4. The examiner notes that the claimed "data layer" appears to refer to a magnetic recording layer, a magneto-optical recording layer or an optical recording layer based upon applicants' disclosure. However, the examiner notes that a written label on a CD would read on applicants' claimed limitations since a written label is a "data layer" (contains information on the artist, maker of the disk, etc), it is located on the substrate and it can be at least partly read from by at least one energy field (visual light) and the energy field (visual light) contacts the data storage layer (i.e. label) before contacting the substrate the label is written on. As such, the examiner has given the present claims the broadest reasonable interpretation when evaluating the prior art.

Specification

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph within the range of 150 words or 15 lines (37 CFR 1.72). See MPEP § 608.01(b).

The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure

sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In addition, the Abstract should not include a Paragraph number, since it is a stand alone Paragraph.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1 – 59 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a storage **disk**, does not reasonably provide enablement for a storage tape or ribbon. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Amendment to change "A data storage media" to "A data storage disk" would overcome this rejection. For purposes of evaluating the prior art, the claims have been interpreted in view of the specification as described above, especially in view of the numerous claimed properties which are only present in disk-shaped media (edge lift, "rotating", etc).

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1 – 59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Regarding claims 1, 4 – 7, 10 – 29, 35, 36 and 59, it has been found that the phrase “less than about” (or “greater than about” and other equivalent statements) are indefinite barring a showing in the specification as to what values around the endpoint are envisioned to be encompassed by the word “about”. *Ex parte Lee*, 31 USPQ2d 1105 (BdPatApp&Int. 1993). In the instant case, applicant(s) have used the **mathematical expression** “less than about” (or its equivalents), namely “greater than about”. In both cases, the phrases used have **exact** meanings (i.e. “greater than” and/or “less than”) which are combined with a **non-exact** modifier (i.e. “about”). As such, the expressions are indefinite since the exact expression(s) “greater than” and “less than” require(s) an exact endpoint and the modifier “about” removes that exact endpoint. Only in cases where it is clear from provided experimental data what the “about” is intended to encompass are the phrases “less than about” or “greater than about” (or their equivalents) considered definite. The examiner recommends using non mathematically exact expressions such as “about X, or less” or “about X, or more”.

As an example to better illustrate the Office’s position, applicants should consider the following. The limitation “less than 10”, clearly covers a range of “any value less

Art Unit: 1773

than the value of 10, **excluding** 10". "Less than or equal to 10", clearly covers a range of "any value less than the value of 10, **including** 10". These limitations are not equivalent in that one provides more coverage than the other (i.e. a value of exactly 10 would only infringe on the latter limitation). Less than "about 10" is not clear because it isn't clear if the "about 10" implies values on the side already provided for by the "less than" part (i.e. an equivalent expression to "less than 9.993" instead of "less than 10") or if it is attempting to gain additional coverage by both **including** 10 and then some (i.e. an equivalent expression to "less than 10.0234" instead of "less than or equal to 10"). Since the specification does not provide guidance as to what the "about" covers, the claim is indefinite in terms of U.S.C. 112 2nd Paragraph since one of ordinary skill could not reasonably ascertain the full scope of the claim.

12. Claims 1 – 59 recite limitations that require the storage media to be a disk (i.e. "rotating a storage medium"), yet there is no antecedent basis for the a disk-shaped media. See also Paragraph 8, above.

Double Patenting

13. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Art Unit: 1773

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

14. Claims 1, 3, 5, 6, 11 – 31, 33, 34 and 37 – 58 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 72 of copending Application No. 09/845,743 in view of Yamashita et al. (U.S. Patent No. 6,411,457 B2). This is a provisional obviousness-type double patenting rejection.

Application '743 claims a storage media having a substrate comprising at least one plastic resin portion and at least one data layer disposed on at least one surface of said substrate, wherein said substrate has a surface roughness of less than about 10 Å and an axial displacement peak of less than about 500 μ under shock or vibration excitation; directing an energy field at said storage media such that said energy field is incident upon the data layer before it can be incident upon the substrate; and retrieving information from the data layer via said energy field (*claim 1*).

Application '743 fails to claim rotating the storage media at constant or variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed in order to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the claimed invention of application '743 to rotate the storage medium at a variable speed in order to utilize a CLV system.

Application '743 further claim substantially identical/overlapping limitations as present claims 5, 6, 11 – 31, 33, 34 and 37 – 58 (*App. '743, claims 2 – 72*).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 1, 5 – 7 and 11 - 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. (U.S. Patent No. 5,538,774).

Regarding claims 1, 11 – 13, 16 – 18 and 24, Landin et al. disclose a method for retrieving data, comprising rotating a storage media (*col. 2, line 66 bridging col. 3, line 8*) having a substrate comprising at least one plastic portion (*Figure 2, element 8 and col. 6, lines 1 – 2 and 42 – 67*), and at least one data layer disposed on at least one surface of said substrate (*elements 6a and 6b*); directing an energy field at said storage media (*col. 1, lines 25 – 27*) such that said energy field is incident upon the data layer before it can be incident upon the substrate (*col. 2, line 63 bridging col. 3, line 8; see also Paragraph 4 above*); and retrieving information from the data layer via said energy field (*col. 1, lines 25 – 27 and col. 2, line 63 bridging col. 3, line 8*).

It has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of obviousness has been

Art Unit: 1773

established and the burden of proof is shifted to applicant to show that prior art products do not necessarily possess characteristics of claimed products where the rejection is based on *prima facie* obviousness under 35 USC 103. Therefore, the *prime facie* case can be rebutted by **evidence** showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

In the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*col. 5, lines 58 – 64; col. 11, lines 1 – 5; and examples*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of "an edge-lift height" and "an axial displacement peak" meeting applicants' claimed limitations would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed limitations of "an edge-lift height" and "an axial displacement peak" would not have necessarily been present in every embodiment taught by Landin et al., it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables such as the

Art Unit: 1773

“edge lift height” and “axial displacement peak” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that low values of the edge lift and axial displacement peak are desired for increased areal recording density (see pertinent prior art cited below). *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Landin et al. fail to disclose a surface roughness meeting applicants’ claimed limitations (i.e. less than 10 Å or less than 5 Å).

However, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variable “surface roughness” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. < 10 Å) surface roughness values are required for near-field high density recording media (see pertinent prior art cited below).

Regarding claims 5 - 7, the claimed areal recording density is a function of the track width, track density and spatial location of the head relative to the medium, and is not a property solely of the substrate, per se, and therefor has been given little weight in determining patentability since it is an intended-use limitation (see pertinent prior art cited below). “[I]n apparatus, article, and composition claims, intended use must result in a **structural difference** between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. **If the prior art structure is capable of performing the intended use, then it meets the claim.** In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art.” [emphasis added] *In re Casey*, 370 F.2d 576, 152 USPQ

235 (CCPA 1967); *In re Otto*, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

See MPEP § 2111.02.

Regarding claims 14, 15, 19 - 23, 25 – 29 and 56 - 59, these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the Landin et al. reference. However, in the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*col. 5, lines 58 – 64; col. 11, lines 1 – 5; and examples*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of 24 °C (claims 14, 15, 19, 20, 25 and 26);
- a moment of inertia of less than 5.5×10^{-3} slug-in², 4.5×10^{-3} slug-in² and 4.0×10^{-3} slug-in² (claims 21 - 23);
- a moisture content which varies less than 0.5% at the claimed test conditions (claim 27);
- a resonant frequency of greater than 250 Hz (claim 28);
- a specific gravity of less than 1.5 (claim 29);
- a first modal frequency greater than an operating frequency (claims 56 and 57);
- only one modal frequencies less than an operating frequency (claim 58); and
- a flexural modulus of greater than 250 kpsi (claim 59),

would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by Landin et al., it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables moment of inertia, the moisture content variability, the specific gravity and the number of modal frequencies less than an operating frequency of the substrate, as well as increasing the mechanical damping coefficient, flexural modulus, resonant frequency and first modal frequency to values meeting applicants' claimed limitations since one of ordinary skill in the art recognizes that controlling all of these properties to within applicants' claimed limitations is necessary to achieve a dimensionally stable, high start-stop time recording media for high areal recording density applications (see pertinent prior art cited below).

Furthermore, regarding claim 57 above, the examiner notes that since all substrates necessarily possess a flexural modulus and a specific gravity, given the situation that the first modal frequency is outside of an operating frequency range, all substrates will necessarily meet applicants' claimed limitation (i.e. since no numerical values for the modulus or specific gravity are claimed in claim 57, if the first modal frequency is outside the operating frequency range then clearly whatever the value of

the modulus and specific gravity, these values clearly are adequate to “place the first modal frequency outside of an operating frequency range”.

Regarding claims 30 - 34, 37 and 38, Landin et al. disclose substrate/core/additive materials meeting applicants' claimed limitations (*col. 5, lines 58 – 64; col. 6, lines 1 – 2 and 42 – 67; and col. 7, lines 23 - 67*).

Regarding claims 51 and 52, the limitation “preformed cores” and “formed in situ with said substrate” are product-by-process limitation and are not further limiting in so far as the structure of the product is concerned. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. ***The patentability of a product does not depend on its method of production.*** If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” [emphasis added] *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113. Once a product appearing substantially identical is found, the burden shifts to applicant to show an ***unobvious*** difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). In the instant case, the final product is deemed to be the same whether the damping material (i.e. “core”) was formed along with the rest of the substrate or if the damping material was performed and then made into the substrate.

Regarding claims 35 and 36, Landin et al. disclose said plastic resin portion having a thickness meeting applicants' claimed limitations (*col. 10, lines 24 – 28*). The

Art Unit: 1773

exact thickness is a cause effective variable based on the damping characteristics desired (*col. 5, lines 44 – 57*). It would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the plastic resin portion thickness through routine experimentation, especially given the teachings in Landin et al. regarding desired thickness values and the affect the amount of material used has on the damping characteristics.

Regarding claims 39, 42, 45 – 50 and 53 - 55, Landin et al. disclose substrates/cores/"inserts" meeting applicants' claimed limitations (i.e. solid or hollow cores having substantially constant thickness) (*Figures 2 – 4b, elements 8, 12a/12b, 32, 33, 35 and 52 – 54*).

Regarding claims 40, 41, 43 and 44, Landin et al. disclose cores having varied thickness (*Figure 4b, where the core varies from zero to non-zero across the width of the medium – elements 52 – 54*). Landin et al. further teach that the damping layer dimensions can be controlled depending on the area with the greatest vibrational stresses (*col. 5, lines 25 – 30*). The exact geometry of the core is therefore deemed an obvious matter of design choice to control where the most damping occurs (as well as controlling the moment of inertia and specific gravity of the substrate), since such a modification of the core would have involved a mere change in the size of a component. A change in the size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

17. Claims 2 and 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. as applied above, and further in view of Hirata et al. (U.S. Patent No. 6,127,017).

Regarding claim 2, Landin et al. is relied upon as described above.

Landin et al. fail to disclose a method of reproducing where at least a portion of the energy field passes through the data layer and is reflected back through the data layer (i.e. a “reflecting layer” located between the substrate and the data layer).

However, Hirata et al. disclose adding a reflecting layer between the substrate and the data layer, which would necessarily reflect at least a portion of the energy field back through the data layer, if an optical or magneto-optical disk is being produced (*col. 8, lines 37 – 41 and Figure 10*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Landin et al. to include a reflecting layer between the substrate and the data layer, thereby necessarily reflecting at least a portion of the energy field back through the data layer if an optical or magneto-optical disk is being produced.

Regarding claims 8 and 9, Hirata et al. teach adding surface features meeting applicants’ claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant’s invention to modify the device of Landin et al. to include surface features

meeting applicants' claimed limitations as taught by Hirata et al. in order to provide landing zone texture, servo tracking or data patterns.

Regarding claim 10, the percent replication is deemed a cause-effective variable in terms of reproducibility and running quality. It would have been obvious to one having ordinary skill in the art to have maximized the value of a cause effective variable such as the replication percent through routine experimentation, especially given the knowledge that the more reproducible the surface features are the better the servo tracking, data storage and running properties would be (i.e. if the surface features are for servo tracking and are not identical, the tracking would not always be accurate resulting in poor performance).

18. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. as applied above, and further in view of Yamashita et al. ('457 B2).

Landin et al. is relied upon as described above.

Landin et al. fail to disclose rotating said storage media at a variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed in order to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Landin et al. to rotate the storage medium at a variable speed in order to utilize a CLV system.

19. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. as applied above, and further in view of Wu et al. (U.S. Patent No. 6,156,422).

Landin et al. is relied upon as described above.

Landin et al. fail to disclose the coercivity of the data storage layer.

However, Wu et al. teach that for high areal recording density, the “linear recording density can be increased by increasing the coercivity of the magnetic recording medium” (*col. 1, lines 23 – 33*) and further teaches coercivity values meeting applicants’ claimed limitations as desired for high areal recording density recording media (*Figure 4A*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Landin et al. by increasing the coercivity of the data storage layer to values meeting applicants’ claimed limitations as taught by Wu et al., since an increased coercivity results in an increased areal recording density.

20. Claims 1, 5 – 7 and 11 – 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 02-096921 A in view of Landin et al. ('774). See provided Derwent Abstract Translation of JP '921 A.

Regarding claims 1, 11 – 13, 16 – 18 and 24, JP '921 A disclose a storage media comprising a substrate comprising at least one plastic portion (*Abstract - “substrate formed of plastics”*), and at least one data layer disposed on at least one surface of said substrate (*Abstract – “a magnetic layer”*), wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field; and wherein

when the energy field contacts said data storage media, said energy field is incident upon said data layer before it could be incident upon said substrate (*in view of Figures since the protective lubricating layer is located between the magnetic layer and the side where the magnetic head would be; see also Paragraph 4, above*).

It has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily possess characteristics of claimed products where the rejection is based on *prima facie* obviousness under 35 USC 103. In the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Abstract and Figures*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of "an edge-lift height" and "an axial displacement peak" meeting applicants' claimed limitations would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed limitations of "an edge-lift height" and "an axial displacement peak" would not have necessarily been present in every embodiment taught by JP '921 A, it would have been obvious to one having

ordinary skill in the art to have minimized the cause effective variables such as the “edge lift height” and “axial displacement peak” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that low values of the edge lift and axial displacement peak are desired for increased areal recording density (see pertinent prior art cited below).

JP ‘921 A fail to disclose a surface roughness meeting applicants’ claimed limitations (i.e. less than 10 Å or less than 5 Å).

However, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variable “surface roughness” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. < 10 Å) surface roughness values are required for near-field high density recording media (see pertinent prior art cited below).

JP ‘921 A further fail to disclose a method for retrieving data comprising rotating the storage media.

However, Landin et al. teach that it is known in the art to rotate a storage media in order to allow the data stored on the article to be passed by a read or write element to allow reading of information from the article, or writing of information from the article, or both (*col. 2, line 66 bridging col. 3, line 5*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicants’ invention to modify the device of JP ‘921 A to utilize a method meeting applicants’ claimed limitations as taught by Landin et al. in order to allow the data stored

Art Unit: 1773

on the article to be passed by a read or write element to allow reading of information from the article, or writing of information from the article, or both.

Regarding claims 5 - 7, the claimed areal recording density is a function of the track width, track density and spatial location of the head relative to the medium, and is not a property solely of the substrate, per se, and therefor has been given little weight in determining patentability since it is an intended-use limitation (see pertinent prior art cited below).

Regarding claims 14, 15, 19 - 23, 25 - 29 and 56 - 59, these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the JP '921 A reference. However, in the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Abstract and Figures*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of 24 °C (claims 14, 15, 19, 20, 25 and 26);
- a moment of inertia of less than 5.5×10^{-3} slug-in², 4.5×10^{-3} slug-in² and 4.0×10^{-3} slug-in² (claims 21 - 23);
- a moisture content which varies less than 0.5% at the claimed test conditions (claim 27);
- a resonant frequency of greater than 250 Hz (claim 28);
- a specific gravity of less than 1.5 (claim 29);

- a first modal frequency greater than an operating frequency (claims 56 and 57);
- only one modal frequencies less than an operating frequency (claim 58); and
- a flexural modulus of greater than 250 kpsi (claim 59),

would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by JP '921 A, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables moment of inertia, the moisture content variability, the specific gravity and the number of modal frequencies less than an operating frequency of the substrate, as well as increasing the mechanical damping coefficient, flexural modulus, resonant frequency and first modal frequency to values meeting applicants' claimed limitations since one of ordinary skill in the art recognizes that controlling all of these properties to within applicants' claimed limitations is necessary to achieve a dimensionally stable, high start-stop time recording media for high areal recording density applications (see pertinent prior art cited below).

Regarding claims 30, 31, 34, 39, 42, 45 and 48, JP '921 A disclose cores (*Figure 1, element 1a*) meeting applicants' claimed limitations (i.e. solid core having substantially constant thickness) (*Abstract*). The examiner notes that the plastic

Art Unit: 1773

substrate (*element 1a*) is a core comprising at least one filled cavity (i.e. the entire layer is “filled”).

Regarding claims 32 and 33, Landin et al. teach plastics meeting applicants' claimed limitations as known substrate + core materials since they possess good damping properties (*col. 6, lines 1 – 2 and lines 42 – 67*). It would therefore have been obvious to use a plastic meeting applicants' claimed limitations since they are known substrate + core materials and they possess good damping properties.

Regarding claims 35, 36, 47 and 53 – 55, Landin et al. teach adding damping material to a polymeric substrate (*Figures and col. 5, lines 60 – 64*), wherein the damping materials meet applicants' claimed thickness values (*col. 10, lines 23 – 28*), can comprise hollow sections (*Figure 4b and col. 9, lines 62 – 63*); and comprise inserts formed opposite the data layer (*Figures*). Landin et al. further teach that the amount and location of these damping materials can be optimized to control the damping characteristics of the medium (*col. 5, lines 25 – 30 and 44 – 57; col. 9, line 26 bridging col. 10, line 15; col. 10, lines 34 – 47; and Figures*). It would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the damping material thickness, locations and amounts through routine experimentation, especially given the teaching in Landin et al. above.

Regarding claims 37 and 38, Landin et al. teach adding fillers meeting applicants' claimed limitations in order to strengthen the substrate and provide increased damping (*col. 7, lines 23 – 48 and lines 61 – 66; and col. 8, lines 61 – 63*).

Art Unit: 1773

Regarding claims 40, 41, 43 and 44, Landin et al. teach plastic cores of composite substrates having varied thickness and multiple portions (*Figure 4b, where the core varies from zero to non-zero across the width of the medium – elements 52 – 54*). Landin et al. further teach that the plastic core dimensions can be controlled depending on the area with the greatest vibrational stresses (*col. 5, lines 25 – 30*). The exact geometry of the core is therefore deemed an obvious matter of design choice to control where the most damping occurs (as well as controlling the moment of inertia and specific gravity of the substrate), since such a modification of the core would have involved a mere change in the size of a component. A change in the size is generally recognized as being within the level of ordinary skill in the art. It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of JP '921 A to include a core having varied thickness as taught by Landin et al. since varying the core dimensions can be used to optimize the damping, moment of inertia and specific gravity of the substrate, especially in the areas with the greatest vibrational stresses.

Regarding claims 46, 49 and 50, JP '921 A disclose a support for a magnetic recording medium wherein the medium can be in the form of a disk. A disk would result in a plastic support (i.e. applicants' "core") being in the shape of a ring further comprising multiple portions (*i.e. layers 6a and 6b*), thereby meeting applicants' claimed limitations.

Regarding claims 51 and 52, the limitation “preformed cores” and “formed in situ with said substrate” are product-by-process limitation and are not further limiting in so far as the structure of the product is concerned for the reasons cited above.

21. Claims 2 and 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP ‘921A in view of Landin et al. as applied above, and further in view of Hirata et al. (‘017).

Regarding claim 2, JP ‘921 A in view of Landin et al. is relied upon as described above.

Neither JP 921 A nor Landin et al. disclose a method of reproducing where at least a portion of the energy field passes through the data layer and is reflected back through the data layer (i.e. a “reflecting layer” located between the substrate and the data layer).

However, Hirata et al. disclose adding a reflecting layer between the substrate and the data layer, which would necessarily reflect at least a portion of the energy field back through the data layer, if an optical or magneto-optical disk is being produced (*col. 8, lines 37 – 41 and Figure 10*). The examiner notes that Landin et al. disclose that substrates are analogous to optical, magnetic and magneto-optical recording (*col. 11, lines 12 – 20*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of JP 921 A in view of Landin et al. to include a reflecting layer between the substrate and the data layer, thereby necessarily reflecting at least a

portion of the energy field back through the data layer if an optical or magneto-optical disk is being produced.

Regarding claims 8 and 9, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of JP '921 A in view of Landin et al. to include surface features meeting applicants' claimed limitations as taught by Hirata et al. in order to provide landing zone texture, servo tracking or data patterns.

Regarding claim 10, the percent replication is deemed a cause-effective variable in terms of reproducibility and running quality. It would have been obvious to one having ordinary skill in the art to have maximized the value of a cause effective variable such as the replication percent through routine experimentation, especially given the knowledge that the more reproducible the surface features are the better the servo tracking, data storage and running properties would be (i.e. if the surface features are for servo tracking and are not identical, the tracking would not always be accurate resulting in poor performance).

22. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '921 A in view of Landin et al. as applied above, and further in view of Yamashita et al. ('457 B2).

JP '921 A in view of Landin et al. is relied upon as described above.

Neither JP '921 A nor Landin et al. disclose rotating said storage media at a variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed in order to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of JP '921 A in view of Landin et al. to rotate the storage medium at a variable speed in order to utilize a CLV system.

23. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '921 A in view of Landin et al. as applied above, and further in view of Wu et al. ('422).

JP '921 A in view of Landin et al. is relied upon as described above.

Neither JP '921 A nor Landin et al. disclose the coercivity of the data storage layer.

However, Wu et al. teach that for high areal recording density, the "linear recording density can be increased by increasing the coercivity of the magnetic recording medium" (*col. 1, lines 23 – 33*) and further teaches coercivity values meeting applicants' claimed limitations as desired for high areal recording density recording media (*Figure 4A*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of JP '921 A in view of Landin et al. by increasing the coercivity of the data storage layer to values meeting applicants' claimed limitations as

Art Unit: 1773

taught by Wu et al., since an increased coercivity results in an increased areal recording density.

24. Claims 1, 4 – 7, 11 – 31, 33 – 36, 39, 42, 45, 46, 48, 51 – 53 and 56 - 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (U.S. Patent No. 6,433,964 B1).

Regarding claims 1, 11 – 13, 16 – 18 and 24, Chang discloses a method for retrieving data, comprising rotating a storage media (*col. 3, lines 31 – 33*) comprising a substrate comprising at least one plastic portion (*Figures; col. 4, lines 23 – 57; and Example 1*), and at least one data layer disposed on at least one surface of said substrate (*col. 3, lines 54 – 60 and Example 1*), wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field; and wherein when the energy field contacts said data storage media, said energy field is incident upon said data layer before it could be incident upon said substrate (*in view of Figures and col. 4, lines 14 - 21 since the protective and lubricating layers are located between the magnetic layer and the side where the magnetic head would be; see also Paragraph 3, above*).

It has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily possess characteristics of claimed products where the rejection is

based on *prima facie* obviousness under 35 USC 103. In the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Figures; col. 4, lines 23 – 57 and Example 1*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of “an edge-lift height” and “an axial displacement peak” meeting applicants’ claimed limitations would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed limitations of “an edge-lift height” and “an axial displacement peak” would not have necessarily been present in every embodiment taught by Chang, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables such as the “edge lift height” and “axial displacement peak” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that low values of the edge lift and axial displacement peak are desired for increased areal recording density (see pertinent prior art cited below).

Chang fails to disclose a surface roughness meeting applicants’ claimed limitations (i.e. less than 10 Å or less than 5 Å).

However, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variable “surface roughness” to values meeting

Art Unit: 1773

applicants' claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. $< 10 \text{ \AA}$) surface roughness values are required for near-field high density recording media (see pertinent prior art cited below).

Regarding claims 5 - 7, the claimed areal recording density is a function of the track width, track density and spatial location of the head relative to the medium, and is not a property solely of the substrate, per se, and therefor has been given little weight in determining patentability since it is an intended-use limitation (see pertinent prior art cited below).

Regarding claims 14, 15, 19 - 23, 25 - 29 and 56 - 59, these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the Chang reference. However, in the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Figures; col. 4, lines 23 - 57 and Example 1*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of $24 \text{ }^{\circ}\text{C}$ (claims 14, 15, 19, 20, 25 and 26);
- a moment of inertia of less than $5.5 \times 10^{-3} \text{ slug-in}^2$, $4.5 \times 10^{-3} \text{ slug-in}^2$ and $4.0 \times 10^{-3} \text{ slug-in}^2$ (claims 21 - 23);
- a moisture content which varies less than 0.5% at the claimed test conditions (claim 27);

- a resonant frequency of greater than 250 Hz (claim 28);
- a specific gravity of less than 1.5 (claim 29);
- a first modal frequency greater than an operating frequency (claims 56 and 57);
- only one modal frequencies less than an operating frequency (claim 58); and
- a flexural modulus of greater than 250 kpsi (claim 59),

would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by Chang, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables moment of inertia, the moisture content variability, the specific gravity and the number of modal frequencies less than an operating frequency of the substrate, as well as increasing the mechanical damping coefficient, flexural modulus, resonant frequency and first modal frequency to values meeting applicants' claimed limitations since one of ordinary skill in the art recognizes that controlling all of these properties to within applicants' claimed limitations is necessary to achieve a dimensionally stable, high start-stop time recording media for high areal recording density applications (see pertinent prior art cited below).

Regarding claim 4, Chang discloses coercivity values meeting applicants' claimed limitations (*col. 3, lines 54 – 57*).

Regarding claims 30, 31, 33 and 34, Chang discloses substrate and core materials meeting applicants' claimed limitations (*Figures and col. 4, lines 21 – 27 and lines 54 - 57*).

Regarding claims 35 and 36, Chang discloses overlapping thickness values (*col. 4, lines 46 – 53*). It would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the plastic resin thickness through routine experimentation, since the plastic resin thickness effects the damping properties and the weight of the medium.

Regarding claims 39, 42, 45, 46, 48 and 53, Chang discloses cores/inserts/substrates (*Figures*) meeting applicants' claimed limitations (i.e. solid core/substrate having substantially constant thickness). The examiner notes that the core/insert (*Figures 3 and 4*) is a core/insert comprising at least one filled "ring-like" cavity (i.e. the entire layer is "filled").

Regarding claims 51 and 52, the limitation "preformed cores" and "formed in situ with said substrate" are product-by-process limitation and are not further limiting in so far as the structure of the product is concerned for the reasons cited above.

25. Claims 2 and 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang as applied above, and further in view of Hirata et al. ('017).

Regarding claim 2, Chang is relied upon as described above.

Chang fails to disclose a method of reproducing where at least a portion of the energy field passes through the data layer and is reflected back through the data layer (i.e. a "reflecting layer" located between the substrate and the data layer), though Chang does disclose the substrate being capable of use for either magnetic or magneto-optic recording (*col. 2, lines 32 – 35*).

However, Hirata et al. disclose adding a reflecting layer between the substrate and the data layer, which would necessarily reflect at least a portion of the energy field back through the data layer, if an optical or magneto-optical disk is being produced (*col. 8, lines 37 – 41 and Figure 10*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Chang to include a reflecting layer between the substrate and the data layer, thereby necessarily reflecting at least a portion of the energy field back through the data layer if an optical or magneto-optical disk is being produced.

Regarding claims 8 and 9, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chang to include surface features meeting applicants' claimed limitations as taught by Hirata et al. in order to provide landing zone texture, servo tracking or data patterns.

Regarding claim 10, the percent replication is deemed a cause-effective variable in terms of reproducibility and running quality. It would have been obvious to one

Art Unit: 1773

having ordinary skill in the art to have maximized the value of a cause effective variable such as the replication percent through routine experimentation, especially given the knowledge that the more reproducible the surface features are the better the servo tracking, data storage and running properties would be (i.e. if the surface features are for servo tracking and are not identical, the tracking would not always be accurate resulting in poor performance).

26. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang as applied above, and further in view of Yamashita et al. ('457 B2).

Chang is relied upon as described above.

Chang fails to disclose rotating said storage media at a variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed in order to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Chang to rotate the storage medium at a variable speed in order to utilize a CLV system.

27. Claims 32, 37, 38, 40, 41, 43, 44, 47, 49, 50, 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang as applied above, and further in view of Landin et al. ('774).

Chang is relied upon as described above.

Regarding claim 32, Chang fails to disclose plastic resins meeting applicants' claimed material limitations.

However, Landin et al. teach using plastics meeting applicants' claimed limitations as known substrate + core materials since they possess good damping properties (*col. 6, lines 1 – 2 and lines 42 – 67 – “acrylonitrile-butadiene-styrene block copolymers”*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chang to use materials meeting applicants' claimed limitations as taught by Landin et al. since such materials are known substrate materials and possess good damping properties.

Regarding claims 37 and 38, Landin et al. teach adding fillers meeting applicants' claimed limitations in order to strengthen the substrate and provide increased damping (*col. 7, lines 23 – 48 and lines 61 – 66; and col. 8, lines 61 – 63*).

Regarding claims 40, 41, 43 and 44, Landin et al. teach plastic cores of composite substrates having varied thickness and multiple portions (*Figure 4b, where the core varies from zero to non-zero across the width of the medium – elements 52 – 54*). Landin et al. further teach that the plastic core dimensions can be controlled depending on the area with the greatest vibrational stresses (*col. 5, lines 25 – 30*). The exact geometry of the core is therefore deemed an obvious matter of design choice to control where the most damping occurs (as well as controlling the moment of inertia and specific gravity of the substrate), since such a modification of the core would have involved a mere change in the size of a component. A change in the size is generally recognized as being within the level of ordinary skill in the art. It would therefore have

Art Unit: 1773

been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chang to include a core having varied thickness as taught by Landin et al. since varying the core dimensions can be used to optimize the damping, moment of inertia and specific gravity of the substrate, especially in the areas with the greatest vibrational stresses.

Regarding claims 47, 49, 50, 54 and 55, Landin et al. disclose adding cores/inserts comprising damping material, wherein the cores/inserts comprise multiple portions of different material, or are hollow (*Figure 4b*) and wherein the core/inserts are formed opposite the data layer (*Figures*). Landin et al. further teach that the amount and location of these damping materials can be optimized to control the damping characteristics of the medium (*col. 5, lines 25 – 30 and 44 – 57; col. 9, line 26 bridging col. 10, line 15; col. 10, lines 34 – 47; and Figures*). It would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the damping material locations and amounts through routine experimentation, especially given the teaching in Landin et al. above.

28. Claims 1, 5 – 7 and 11 – 30, 32, 33 and 37 – 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. (JP 63-205817 A) in view of Landin et al. ('774). See provided Abstract Translation of JP '817 A.

Regarding claims 1, 11 – 13, 16 – 18 and 24, Otada et al. disclose a data storage media comprising a substrate comprising at least one plastic portion (*Abstract - "heat resistant plastic layer"*), and at least one data layer on said substrate (*Abstract "and*

magnetic layer”), wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field; and wherein when the energy field contacts said data storage media, said energy field is incident upon said data layer before it could be incident upon said substrate (*in view of Figures and Abstract since the magnetic layer is deposited after the underlying layer and it is known in the art that the underlayers are located on the opposite side of the magnetic layer from the side where the magnetic head would be; see also Paragraph 3 above*).

It has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily possess characteristics of claimed products where the rejection is based on *prima facie* obviousness under 35 USC 103. In the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Abstract and Figures*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of “an edge-lift height” and “an axial displacement peak” meeting applicants’ claimed limitations would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed limitations of “an edge-lift height” and “an axial displacement peak” would not have necessarily been present in every embodiment taught by Otada et al., it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables such as the “edge lift height” and “axial displacement peak” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that low values of the edge lift and axial displacement peak are desired for increased areal recording density (see pertinent prior art cited below).

Otada et al. fail to disclose a surface roughness meeting applicants’ claimed limitations (i.e. less than 10 Å or less than 5 Å).

However, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variable “surface roughness” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. < 10 Å) surface roughness values are required for near-field high density recording media (see pertinent prior art cited below).

Regarding claims 5 - 7, the claimed areal recording density is a function of the track width, track density and spatial location of the head relative to the medium, and is not a property solely of the substrate, per se, and therefor has been given little weight in determining patentability since it is an intended-use limitation (see pertinent prior art cited below).

Regarding claims 14, 15, 19 - 23, 25 – 29 and 56 - 59, these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the

Art Unit: 1773

Otada et al. reference. However, in the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Abstract and Figures*).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of 24 °C (claims 14, 15, 19, 20, 25 and 26);
- a moment of inertia of less than 5.5×10^{-3} slug-in², 4.5×10^{-3} slug-in² and 4.0×10^{-3} slug-in² (claims 21 - 23);
- a moisture content which varies less than 0.5% at the claimed test conditions (claim 27);
- a resonant frequency of greater than 250 Hz (claim 28);
- a specific gravity of less than 1.5 (claim 29);
- a first modal frequency greater than an operating frequency (claims 56 and 57);
- only one modal frequencies less than an operating frequency (claim 58); and
- a flexural modulus of greater than 250 kpsi (claim 59),

would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by Otada et al., it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables moment of inertia, the radial and tangential tilt, the moisture content variability, the specific gravity and the number of modal frequencies less than an operating frequency of the substrate, as well as increasing the mechanical damping coefficient, flexural modulus, resonant frequency and first modal frequency to values meeting applicants' claimed limitations since one of ordinary skill in the art recognizes that controlling all of these properties to within applicants' claimed limitations is necessary to achieve a dimensionally stable, high start-stop time recording media for high areal recording density applications (see pertinent prior art cited below).

Regarding claims 30, 39, 42, 45 and 48, Otada et al. disclose cores (*Figures 1, 2 and 4, element 1*) meeting applicants' claimed limitations (i.e. solid core having substantially constant thickness) (*Abstract*). The examiner notes that the ceramic substrate (*Figures 1, 2 and 4 - element 1*) is a core comprising at least one filled cavity (i.e. the entire layer is "filled").

Regarding claim 32, Landin et al. teach plastics meeting applicants' claimed limitations as known substrate + core materials since they possess good damping properties (*col. 6, lines 1 – 2 and lines 42 – 67 – "acrylonitrile-butadiene-styrene block copolymers"*). It would therefore have been obvious to use a plastic meeting applicants' claimed limitations since they are known substrate + core materials and they possess good damping properties.

Regarding claim 33, Otada et al. disclose plastics meeting applicants' claimed limitations (*Abstract – polyether imide*).

Regarding claims 37 and 38, Landin et al. teach adding fillers meeting applicants' claimed limitations to polymeric materials used in substrates in order to strengthen the substrate and provide increased damping (*col. 7, lines 23 – 48 and lines 61 – 66; and col. 8, lines 61 – 63*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Otada et al. to include fillers meeting applicants' claimed limitations in the resin portion of the substrate as taught by Landin et al. in order to strengthen the substrate and provide increased damping.

Regarding claims 40, 41, 43, 44, 46, 47, 49 and 50, Otada et al. disclose cores of composite substrates having varied thickness and multiple portions (*Figure 3, where the core varies from zero to non-zero across the width of the medium and wherein the interior sections of element 1 would be filled by the heat resistant plastic layer, resulting in a "core" layer comprising both ceramic and plastic, the entire "core" coated by additional heat resistant plastic*). The exact geometry of the core is therefore deemed an obvious matter of design choice to control where the most damping occurs (as well as controlling the moment of inertia and specific gravity of the substrate), since such a modification of the core would have involved a mere change in the size of a component. A change in the size is generally recognized as being within the level of ordinary skill in the art. In addition, it is known to one of ordinary skill in the art that the material and

dimensions of the core will effect the damping properties, as well as the moment of inertia and specific gravity of the substrate (see pertinent prior art cited below).

Regarding claims 51 and 52, the limitation “preformed cores” and “formed in situ with said substrate” are product-by-process limitation and are not further limiting in so far as the structure of the product is concerned for the reasons cited above.

Regarding claims 53 – 55, Landin et al. teach adding damping material to a ceramic substrate (*Figures and col. 5, lines 60 – 64*), wherein the damping materials can comprise hollow sections (*Figure 4b and col. 9, lines 62 – 63*) and can comprise inserts formed opposite the data layer (*Figures*). Landin et al. further teach that the amount and location of these damping materials can be optimized to control the damping characteristics of the medium (*col. 5, lines 25 – 30 and 44 – 57; col. 9, line 26 bridging col. 10, line 15; col. 10, lines 34 – 47; and Figures*). It would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the damping material locations and amounts through routine experimentation, especially given the teaching in Landin et al. above.

29. Claims 2 and 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. in view of Landin et al. as applied above, and further in view of Hirata et al. ('017).

Regarding claim 2, Otada et al. in view of Landin et al. is relied upon as described above.

Neither Otada et al. nor Landin et al. disclose a method of reproducing where at least a portion of the energy field passes through the data layer and is reflected back through the data layer (i.e. a “reflecting layer” located between the substrate and the data layer).

However, Hirata et al. disclose adding a reflecting layer between the substrate and the data layer, which would necessarily reflect at least a portion of the energy field back through the data layer, if an optical or magneto-optical disk is being produced (*col. 8, lines 37 – 41 and Figure 10*). The examiner notes that Landin et al. disclose that substrates are analogous to optical, magnetic and magneto-optical recording (*col. 11, lines 12 – 20*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Otada et al. in view of Landin et al. to include a reflecting layer between the substrate and the data layer, thereby necessarily reflecting at least a portion of the energy field back through the data layer if an optical or magneto-optical disk is being produced.

Regarding claims 8 and 9, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Otada et al. in view of Landin et al. to include surface features meeting applicants' claimed limitations as taught by Hirata et al. in order to provide landing zone texture, servo tracking or data patterns.

Regarding claim 10, the percent replication is deemed a cause-effective variable in terms of reproducibility and running quality. It would have been obvious to one having ordinary skill in the art to have maximized the value of a cause effective variable such as the replication percent through routine experimentation, especially given the knowledge that the more reproducible the surface features are the better the servo tracking, data storage and running properties would be (i.e. if the surface features are for servo tracking and are not identical, the tracking would not always be accurate resulting in poor performance).

30. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. in view of Landin et al. as applied above, and further in view of Yamashita et al. ('457 B2).

Otada et al. in view of Landin et al. is relied upon as described above.

Neither Otada et al. nor Landin et al. disclose rotating said storage media at a variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed in order to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Otada et al. in view of Landin et al. to rotate the storage medium at a variable speed in order to utilize a CLV system.

Art Unit: 1773

31. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. in view of Landin et al. as applied above, and further in view of Wu et al. ('422).

Otada et al. in view of Landin et al. is relied upon as described above.

Neither Otada et al. nor Landin et al. disclose the coercivity of the data storage layer.

However, Wu et al. teach that for high areal recording density, the "linear recording density can be increased by increasing the coercivity of the magnetic recording medium" (*col. 1, lines 23 – 33*) and further teaches coercivity values meeting applicants' claimed limitations as desired for high areal recording density recording media (*Figure 4A*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Otada et al. in view of Landin et al. by increasing the coercivity of the data storage layer to values meeting applicants' claimed limitations as taught by Wu et al., since an increased coercivity results in an increased areal recording density.

Conclusion

32. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The examiner notes that there are several references which disclose composite "plastic + rigid material" substrates which are substantially identical to applicants' claimed products. These references include: Lazzari (U.S. Patent No. 4,911,967);

Ishida et al. (U.S. Patent No. 6,347,016 B1); JP 61-105725 A; Tanabe et al. (U.S. Patent No. 5,447,767); Nakayama et al. (U.S. Patent No. 4,673,602); Lewis et al. (U.S. Patent No. 4,363,844); JP 61-242327 A; JP 61-131232 A; JP 62-124625 A; Krongelb et al. (U.S. Patent No. 4,737,877); Leonard et al. (U.S. Patent No. 4,619,804); JP 02-096919 A; JP 61-092814 A; and JP 62-134836 A.

In addition, many references deal with controlling or optimizing physical and mechanical properties of substrates. These are:

- Surface Roughness – Hirata et al. (U.S. Patent No. 6,127,017 – *teach plastic supports where $Ra < 20 \text{ \AA}$*); Annacone et al. (U.S. Patent No. 6,194,045 – *teach core/shell ceramic substrate with $Ra < 10 \text{ \AA}$*); Yamaguchi (U.S. Patent No. 5,866,489 – *teach glass substrate with $Ra = 2 - 10 \text{ \AA}$*); Hartog et al. (U.S. Patent No. 6,236,542 B1 – *teach metal/glass/ceramic substrates polished to $\sim 1 \text{ \AA}$ Ra*); Tenhover et al. (U.S. Patent No. 5,741,403 – *teach $Ra < 25 \text{ \AA}$ required for high areal recording density*); Bonnebat et al. (U.S. Patent No. 4,987,020 – *teach minimizing Ra as a critical feature of substrates*);
- Modal and Resonant Frequencies – Miyake et al. (U.S. Patent No. 5,585,159 – *teach damping to avoid the resonant frequency being in the operating temperature range*); Kuromiya et al. (U.S. Patent No. 5,585,989 – *teach having the first modal frequency above the servo band*); Oniki et al. (U.S. Patent No. 5,875,083 – *teach avoiding the resonant frequency being within the servo range*);

- Variable thickness, filled/hollow, shape of cores/substrates – Landin et al. ('774) and Otada et al. ('817 A) as described above; Annacone et al. ('045 – *teach core/shell structures which can vary in shape and size*); Kikuchi (U.S. Patent No. 5,119,259 – *teach hollow substrates*); Oishi (U.S. Patent No. 4,742,420 – *teach porous and hollow substrates*); Zagar et al. (U.S. Patent No. 5,552,009 – *teach disk, tape or other shaped media*); Fujii et al. (U.S. Patent No. 5,292,550 – *teach making entire substrate convex or concave*); Vedamuttu (U.S. Patent No. 6,165,391 – *teach substrates being variable shape or non-homogenous*);
- Equivalence of substrates for magnetic/optical/magneto-optical – Nakayama et al. (U.S. Patent No. 4,673,602); Landin et al. ('774);
- Areal Recording Density – Hartog et al. ('542), Tenhover et al. ('403) and Annacone et al. ('045) all teach that the areal recording density is a function of more than just the medium;
- Specific Gravity/density – Mori et al. (U.S. Patent Application Publication 2001/0022705 A1 – *teach controlling the specific gravity*); Stanish et al. (U.S. Patent No. 5,948,495 – *teach controlling the density*); and Bonnebat et al. ('020 – *teach controlling specific gravity*);
- Axial displacement peak – Sandstrom (U.S. Patent No. 5,972,461 – *teach minimizing the axial displacement*); Quantegy article (*teach ranges for acceptable axial displacement*);

- Warp/deflection/tilt – Sandstrom ('461 – *teach minimizing the warp/deflection and tilt*); Quantegy article (*teach minimizing deflection and tilt*); Zou et al. (U.S. Patent No. 5,981,015 – *teach minimizing deflection and warp*); Czubarrow (U.S. Patent No. 6,030,681 – *teach minimizing warp*); Stanish et al. ('495 – *teach minimizing warp and deflection*);
- Thermal Characteristics – Czubarrow ('681 – *teach controlling the thermal characteristics to be stable*); Bonnebat et al. ('020 – *teach having stable thermal characteristics*); Quantegy article (*teach having stable systems for 1,000,000+ cycles in a wide range of temperature and humidity*);
- Moment of Inertia – Bonnebat et al. ('020 – *teach minimizing the moment of inertia*); Quantegy article (*teach minimizing the moment of inertia of the substrate*);
- Damping Characteristics – Landin et al. ('774); Mori et al. ('705 – *teach values for the damping coefficient*); and
- Flexural Modulus – Annacone et al. ('045 – *teach high elastic modulus allows a rigid core/substrate to be machined to “very accurate flatness tolerance”*); Bonnebat et al. ('020 – *teach desiring a high rigidity*); Czubarrow et al. ('681 – *teach increasing the elastic modulus to increase rigidity and gives values for Al, glass and ceramic substrates*); and Kuromiya et al. ('989 – *teach forming norbornene resin substrates with a flexural modulus of greater than 355 kpsi with “excellent surface roughness”*).

Art Unit: 1773

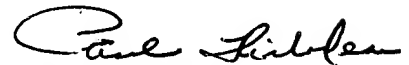
33. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310/872-9310 for regular communications and (703) 872-9311/872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



KMB
March 21, 2003



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700